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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/309,361	05/11/1999	LEE J. BURROWS	NUFO-002	7398

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EXAMINER	
VINH, LAN	
ART UNIT	PAPER NUMBER
1765	25

DATE MAILED: 08/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

mk-25

Office Action Summary	Application No. 09/309,361	Applicant(s) BURROWS, LEE J.	
	Examiner Lan Vinh	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 June 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-13,19-22,26-35 and 37-64* is/are pending in the application.

4a) Of the above claim(s) *19-21 and 26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-13,22, 27-35 and 37-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 6/5/2002 for a Request for Continued Examination (RCE) under 37 CFR &1.114 based on parent Application No. 09/309361 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 5-8, 22, 27, 30-34, 44, 49-52, 57-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 5,442,719) in view of Stoll (US 5,902,519)

Chang discloses a method for making electro-optic lithium niobate waveguides. This method comprises the steps of:

heating/annealing the lithium niobate/lithium tantalate waveguide/structure to 400-1000^0 C (col 1, lines 57-58), overlaps the claimed temperature range of 150-500^0 C as recited in claims 57 and 61, in a closed chamber while oxygen was continuously delivered to the chamber (col 3, lines 6-8). Chang's heating step reads on heating the lithium niobate/lithium tantalate structure in a sealed pure oxygen gas atmosphere substantially lacking of H_2O to within a temperature range of 150-500^0 C

pressurizing the chamber in the presence of oxygen at about atmospheric pressure/ambient atmospheric pressure (col 1, lines 59-60)

holding the temperature and pressure of the chamber for about 7 hours (col 3, lines 12-13) reads on maintaining temperature and pressure for an anneal period

allowing the temperature of the chamber to fall/ cooling the chamber to 20^0 C/room temperature (col 3, lines 14-15)

Unlike the instant claimed inventions as per claims 1, 22, 57, 61, Chang does not specifically disclose the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure.

However, Stoll discloses a process for oxidizing lithium niobate comprises the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure (10-100 atmospheres) (col 31-33)

Since both Chang and Stoll are concerned with heating lithium niobate in an oxygen atmosphere in a sealed chamber, one skilled in the art would have found it obvious to modify Chang 's method by pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure as per Stoll because Stoll states that large lithium niobate crystal will necessarily require proportionately greater pressure of oxygen (col 4, lines 33-35)

Regarding claims 2, 27, Chang discloses placing lithium niobate/lithium tantalate powder into the chamber with the lithium niobate wafer/structure (col 3, lines 4-6). Since Chang teaches the same method using the same material as the claimed invention, one skilled in the art would have found it obvious that Chang step of placing

lithium niobate powder into the chamber with the lithium niobate wafer/structure would have retarded outgassing of lithium oxide from the lithium niobate wafer.

Regarding claims 5, 32, although Chang as modified by Stoll disclose pressurizing the oxygen above ambient atmospheric pressure, Chang and Stoll do not disclose the specific claimed pressure. However, one skilled in the art would have found it obvious to adjust the pressure/process variable through routine experimentation to obtain the best result.

Regarding claims 6, 30, 49-52, 58, 59, 62, 63, Chang discloses heating the lithium niobate/lithium tantalate to a temperature of 400-1000^0 C (col 1, lines 58-59) overlaps the claimed range of 150-900^0 C, 150-600^0 C

Regarding claims 60, 64, Chang also discloses raising the temperature in the chamber from ambient/room temperature to about 1050^0 C (col 3, lines 8-10) overlaps the claimed range of 300^0 C

The limitations of claims 34, 44 (lithium niobate/lithium tantalate waveguide structure) has been discussed above.

Regarding claims 7, 31, Chang does not disclose cooling the lithium niobate within a range of 0.5-40^0 C per minute although Chang discloses the temperature was allowed to fall rapidly. However, Stoll discloses cooling the lithium niobate at a rate not to exceed 50^0 C per minute (col 4, lines 46-48). One skilled in the art would have found it obvious to modify Chang cooling step using Stoll's teaching since Stoll teaches that such cooling rate is necessary to prevent formation of crack within the crystal (col 4, lines 49-51)

Regarding claims 8, 33, Chang does not disclose heating the lithium niobate within a range of 0.5-12^0 C per minute although Chang discloses raising the temperature at 20^0 C per minute. However, Stoll also discloses heating the lithium niobate at a rate not to exceed 50^0 C per minute (col 4, lines 36-38). One skilled in the art would have found it obvious to modify Chang heating step using Stoll's teaching since Stoll teaches that such controlled rate of heating is necessary to prevent formation of crack within the crystal (col 4, lines 39-41)

4. Claims 3, 9,12, 13, 28, 35, 38, 39-43, 45-48, 53-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 5,442,719) in view of Stoll (US 5,902,519) and further in view of Chen et al (US 4,196,963)

Chang discloses a method for making electro-optic lithium niobate waveguides. This method comprises the steps of:

placing lithium niobate powder into the chamber with the lithium niobate/lithium tantalate wafer/structure (col 3, lines 4-6) reads on locating the lithium niobate/lithium tantalate powder in a space proximate to the lithium niobate structure. Since Chang teaches the same method using the same material as the claimed invention, one skilled in the art would have found it obvious that Chang step of placing lithium niobate powder into the chamber/ or in a space proximate with the lithium niobate wafer/structure would have retarded outgassing of lithium oxide from the lithium niobate wafer.

heating/annealing the lithium niobate waveguide/structure and the lithium niobate powder in a closed chamber while oxygen was continuously delivered to the chamber (

col 3, lines 6-8). Chang's heating step reads on heating the lithium niobate structure and lithium niobate powder in a sealed pure oxygen gas atmosphere

pressurizing the chamber in the presence of oxygen at about atmospheric pressure/ambient atmospheric pressure (col 1, lines 59-60)

holding the temperature and pressure of the chamber for about 7 hours (col 3, lines 12-13) reads on maintaining temperature and pressure for an anneal period

allowing the temperature of the chamber to fall/ cooling the chamber to 20^0 C/room temperature (col 3, lines 14-15)

Unlike the instant claimed inventions as per claims 3, 9, 28, 35, Chang does not specifically disclose the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure.

However, Stoll discloses a process for oxidizing lithium niobate comprises the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure (10-100 atmospheres) (col 31-33)

Since both Chang and Stoll are concerned with heating lithium niobate in an oxygen atmosphere in a sealed chamber, one skilled in the art would have found it obvious to modify Chang 's method by pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure as per Stoll because Stoll states that large lithium niobate crystal will necessarily require proportionately greater pressure of oxygen (col 4, lines 33-35)

Chang and Stoll do not disclose the step of separating the space including the lithium niobate powder from the lithium niobate structure with an interface porous to lithium outgassed from the lithium niobate powder.

However, Chen discloses a method for eliminating lithium oxide out-diffusion from lithium niobate/lithium tantalate structure comprises the step of wrapping the lithium niobate structure in platinum foil/porous interface during annealing the lithium niobate structure in lithium niobate powder to avoid contact with the lithium niobate powder (col 5, lines 43-45). Chen's teaching reads on the step of separating the space including the lithium niobate powder from the lithium niobate structure with an interface porous to lithium outgassed from the lithium niobate powder.

Hence, one skilled in the art would have found it obvious to modify Chang and Stoll by wrapping the lithium niobate/lithium tantalate structure in platinum foil/porous interface during annealing the lithium niobate structure as per Chen because according to Chen wrapping the lithium niobate structure in platinum foil/porous interface during annealing the lithium niobate structure in order to avoid contact with the lithium niobate powder reduces the desired change I the refractive index of the lithium niobate waveguides (col 5, lines 41-45)

Regarding claims 12, 38, Chang discloses that oxygen was continuously delivered to the closed chamber (col 3, lines 6-7) reads on sealed pure oxygen gas atmosphere substantially lacks in H_2O

Regarding claims 13, 42, Chang and Chen do not disclose cooling the lithium niobate within a range of 0.5-40^0 C per minute although Chang discloses the

temperature was allowed to fall rapidly. However, Stoll discloses cooling the lithium niobate at a rate not to exceed 50^0 C per minute (col 4, lines 46-48). One skilled in the art would have found it obvious to modify Chang and Chen cooling step using Stoll's teaching since Stoll teaches that such cooling rate is necessary to prevent formation of crack within the crystal (col 4, lines 49-51)

Regarding claims 39, 45, 53, 54, 55, 56, Chang discloses heating the lithium niobate to a temperature of 400-1000^0 C (col 1, lines 58-59) overlaps the claimed range of 150-900^0 C, 150-600^0 C

Regarding claims 40, 46, Chang and Chen do not disclose heating the lithium niobate within a range of 0.5-12^0 C per minute although Chang discloses raising the temperature at 20^0 C per minute. However, Stoll also discloses heating the lithium niobate at a rate not to exceed 50^0 C per minute (col 4, lines 36-38). One skilled in the art would have found it obvious to modify Chang and Chen heating step using Stoll's teaching since Stoll teaches that such controlled rate of heating is necessary to prevent formation of crack within the crystal (col 4, lines 39-41)

Regarding claims 41, 47, although Chang as modified by Stoll disclose pressurizing the oxygen above ambient atmospheric pressure, Chang and Stoll do not disclose the specific claimed pressure. However, one skilled in the art would have found it obvious to adjust the pressure/process variable through routine experimentation to obtain the best result.

The limitations of claims 43, 48 (lithium niobate/lithium tantalate waveguide structure) has been discussed above.

5. Claims 4, 11, 29, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 5,442,719) in view of Stoll (US 5,902,519) and further in view of Chen et al (US 4,196,963) and Byer et al (US 5,714, 198)

Chang as modified by Stoll and Chen has been described above in paragraph 4. Unlike the instant claimed inventions as per claims 4, 11, 29, 37, Chang, Stoll and Chen do not specifically disclose that the porous interface includes a porosity of approximately 20 microns.

However, Byer discloses separating the lithium niobate wafer from the lithium niobate powder with a titanium line grating/porous interface having grating ranges from 15-22 microns to prevent outdiffusion of lithium oxide during annealing (col 6, lines 47-65). Byer's teaching reads on separating the lithium niobate wafer from the lithium niobate powder with a porous interface having porisity from 15-22 microns to prevent outdiffusion of lithium oxide during annealing.

Hence, one skilled in the art would have found it obvious to modify Chang, Stoll and Chen step of separating the lithium niobate wafer from the lithium niobate powder by using a porous interface having porisity from 15-22 microns as taught by Byer in order to produce an expected result.

Response to Arguments

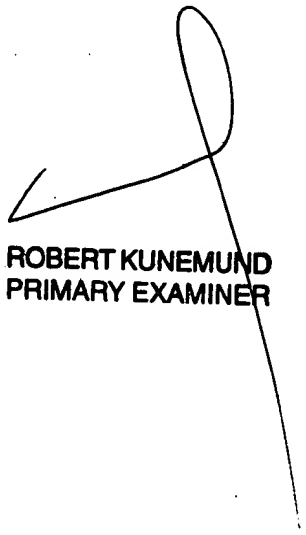
6. Applicant's arguments with respect to claims 1-13, 22, 27-48 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



ROBERT KUNEMUND
PRIMARY EXAMINER

LV
August 21, 2002